MORITA

Apex Locator

ROOT ZX III

Canal Measurement Module

Operation Instructions

∗ This is Canal Measurement Module. Handpiece / LED Module (sold separately) can be easily connected to this module so that preparation can be performed while measuring the canal and the light cure can be applied.

US PAT. 5096419	JP PAT. 2873722
US PAT. 5122556	JP PAT. 2873725
US PAT. 5295833	JP PAT. 3071245
DE PAT. 4126753	JP PAT. 3071270
DE PAT. 4139424	JP PAT. 3113109
DE PAT. 4232487	JP PAT. 3113095

Manufactured by J. MORITA MFG. CORP.

Thank you for purchasing ROOT ZX II Canal Measurement Module.
For optimum safety and performance, read this manual thoroughly before using the unit and pay close attention to warnings and notes. Keep this manual in a readily accessible place for quick and easy reference. This manual contains essential safety information.

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1. Prevent Accidents

Most operation and maintenance problems result from insufficient attention being paid to basic safety precautions and not being able to foresee the possibilities of accidents.

Problems and accidents are best avoided by foreseeing the possibility of danger and operating the unit in accordance with the manufacturer's recommendations.

First thoroughly read all precautions and instructions pertaining to safety and accident prevention; then, operate the equipment with the utmost caution to prevent either damaging the equipment itself or causing bodily injury.

Note the meaning of the following symbols and expressions:

⚠ **WARNING**	This warns that it may result in serious injury of the patient or operator if the instructions are not followed properly.
⚠ **PROHIBITION**	The user can not use in such a way that may result in serious injury of the patient or operator.
⚠ **NOTE**	This alerts the user to the possibility of damage to the equipment, potential injury of the patient or operator, or important points concerning operation and performance.

The user (e.g. the hospital, clinic etc.) is the party responsible for the maintenance and proper operation of ROOT ZX II dental device.

ROOT ZX II dental device must only be operated by dentists and other legally licensed professionals.

Do not use this equipment for anything other than its specified purpose.

⚠ WARNING

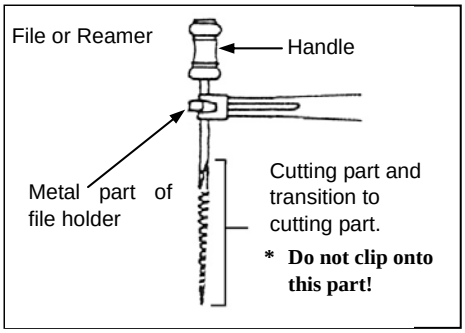
- *This unit must not be connected to or used in combination with any other apparatus or system. It must not be used as an integral component of any other apparatus or system.*
  J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, bodily injury or any other trouble which results from ignoring this prohibition.
- *Accurate canal measurement is not always possible depending on the shape and condition of the tooth as well as a decline in the equipment's performance.*
- *Do not use damaged file holders; an accurate measurement can not be made with a damaged file holder.*
- *When continuous tone is heard while the main power switch is on and without any operation, some electrical part may be malfunction. Do not use the unit and send the unit to J. Morita regional office for repairing.*
- *This unit is for prescription use only.*
- *A rubber dam should be used when performing endodontic treatment.*
- *Caution: US Federal law restricts this unit to sale by or on the order of a dentist in U.S.A.*
- *Check the unit's operation before each patient. If the indicators in the display do not all appear normally, the instrument may not be able to make an accurate measurement. In this case, stop using the instrument and have it repaired. (see page 9)*
- *Never use the unit if the battery power indicator is flashing on and off. The unit will not function properly if the battery power is low. (see page 10)*
- *Check the settings displayed after selecting memories. (see page 10)*
- *In some cases such as a blocked canal, a measurement cannot be made. (see page 11)*
- *Always check the measurement with an x ray. In some cases, an accurate measurement cannot be made because of the canal shape, unusual cases, or poor performance of the instrument. (see page 11)*
- *Stop using the instrument immediately if you sense something odd or abnormal while taking a measurement. (see page 11)*
- *Do not use an ultrasonic scaler with the contrary electrode attached to the patient. This is dangerous because electrical noise from the scaler could interfere with canal measurements and motor operation. (see page 12)*
- *Make sure that the contrary electrode, file holder, handpiece file electrode, etc., do not come into contact with an electric power source such as an electrical socket. This could result in a severe electrical shock. (see page 12)*
- *Do not use the unit if the battery power display is flashing. The unit may not function properly if the battery power is low. (see page 17)*
- *Autoclave file holder and contrary electrode after each patient. (see page 19)*
- *The DP-ZX-VL needs special precaution regarding EMC and needs to be installed and put into service according to the EMC information provided in the Accompanying Documents.*
- *Portable and mobile RF communications equipment can affect the DP-ZX-VL.*
- *Use of the parts other than those accompanied or specified by J. Morita Mfg. Corp. may result in increased EMC emissions or decreased EMC immunity of the DP-ZX-VL.*
- *The DP-ZX-VL should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, the DP-ZX-VL should be observed to verify normal operation in the configuration in which it will be used.*

⚠ PROHIBITION

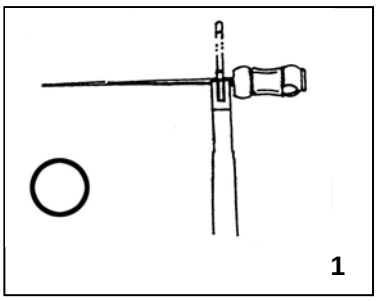
- ***Do not use this unit in conjunction with an electric scalpel or on patients who have a pacemaker.***
- ***Do not use this unit in the medical operation room.***
- ***Blocked canals cannot be accurately measured.***
- ***This unit must not be connected to or used in combination with any other apparatus or system. It must not be used as an integral component of any other apparatus or system.***
  J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, bodily injury or any other trouble which results from ignoring this prohibition.
- ***Illumination devices such as fluorescent lights and the Film viewer which use an inverter can cause ROOT ZX II to operate erratically. Do not use ROOT ZX II near devices such as these.***
- ***Electromagnetic wave interference could cause this device to operate in an abnormal, random and possibly dangerous manner. Cellular phone, transceivers, remote controls and all other devices which transmit electromagnetic waves located inside the building should be turned off.***

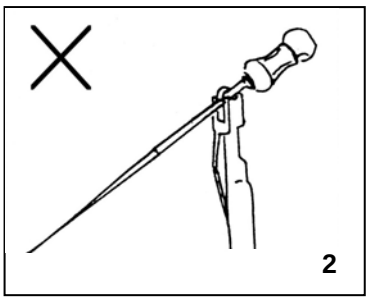
⚠ NOTE

- ***Canal Measurement Module is shipped without the batteries installed. Remove the cover and install the 3 AA batteries. (see page 7)***
- ***Do not reverse the plus and minus poles. (see page 7, 18)***
- ***Never allow the spring contact to push against the edge of the battery. This could damage the outer cover causing a short or a leakage of battery liquid. (see page 7, 18)***
- ***If the catch on the bottom is not back in its original place after attachment, push it in the direction shown by the arrow in the illustration. (see page 7, 18)***
- ***After installation, give the cover a light tug to confirm it is securely attached. (see page 7, 18)***
- ***Handle Canal Measurement Module carefully; do not drop, bump or expose it to other kinds of impacts or shocks. Rough handling could cause damage. (see page 8)***
- ***Make sure the plug is securely plugged into the jack. A poor connection can cause malfunction. (see page 8)***
- ***Do not drop anything on or bang the plug after it has been inserted into the jack. (see page 8)***
- ***Make sure to match colors of the file holder and contrary electrode to the probe cord. (see page 8)***
- ***Measurements cannot be made if these connections are reversed. (see page 8)***
- ***Do not let the file touch the gums. This will cause the meter to jump to Apex. (see page 11)***
- ***If the canal is extremely dry, the meter may not move until it is quite close to the apex. If the meter does not move, try moistening the canal with oxydol or saline. (see page 11)***
- ***Occasionally the canal length indicator bar makes a sudden and large movement as soon as the file is inserted into the root canal, but it will return to normal as the file is advanced down towards the apex. (see page 11)***
- ***The contrary electrode could cause an adverse reaction if the patient has an allergy to metals. Ask the patient about this before using the contrary electrode. (see page 12)***



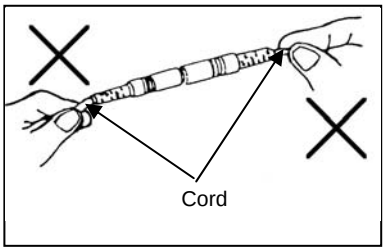
- ***Take care that medicinal solutions such as formalin cresol (FC) or sodium hypochlorite do not get on the contrary electrode or the file holder. These could cause an adverse reaction such as inflammation. (see page 12)***
- ***Always clip the file holder to the upper part of file shaft, near the handle. The metal and plastic part of the file holder can be damaged if they are attached to the file's cutting part or the transition to the cutting part. (see page 12)***
- ***Use files and reamers with plastic handles only. If the file has a metal handle, electrical leakage will occur when the handle is touched by fingers and it will prevent an accurate root canal measurement. Even if the file handle is made of plastic, make sure not to touch the metal part of the file with finger. (see page 13)***
- ***Do not use damaged file holders. An accurate measurement cannot be made using a damaged file holder. (see page 13)***
- ***Clip the file as shown in illustration #1 below. If the file is forced into the position shown in illustration #2, it may not make an accurate measurement and the file holder could be damaged. (see page 13)***





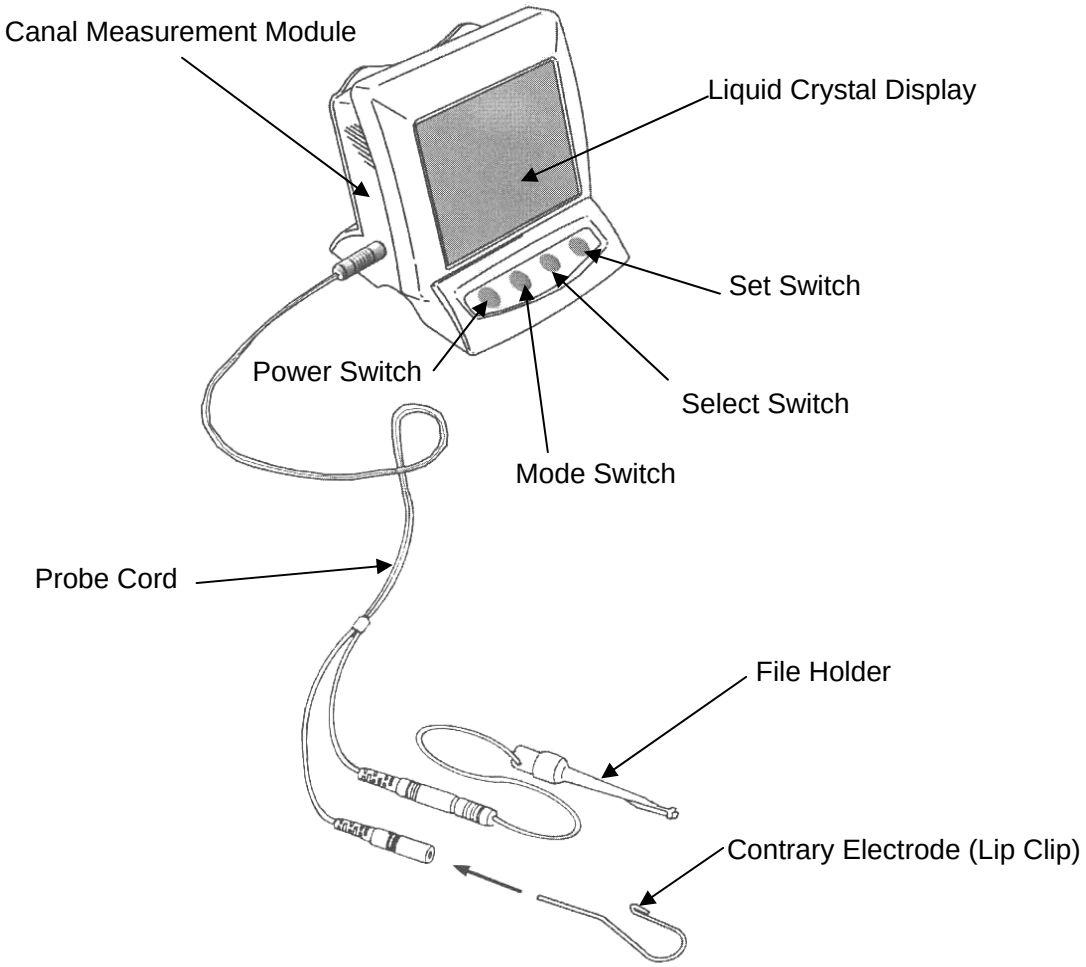
⚠ NOTE

- ***Make sure to take an x-ray to check the results. (see page 13)***

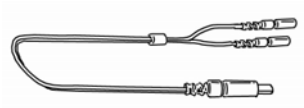
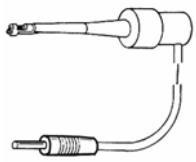
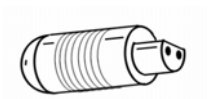
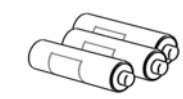
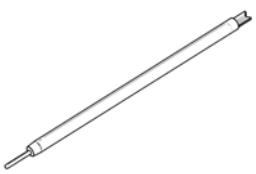


- ***When disconnecting and connecting the contrary electrode, probe cord and file holder, never pull or push on the cords themselves; always grip the connectors. (see page 17)***
- ***Do not wrap the probe cord around the body of the main tube. (see page 17)***
- ***Always use alkaline AA batteries. (see page 18)***
- ***Never use rechargeable nickel-hydrogen or nickel-cadmium batteries. (see page 18)***
- ***Replace all three batteries at the same time. (see page 18)***
- ***Make sure that the plus and minus poles are correctly aligned. (see page 18)***
- ***Never use batteries that are leaky, deformed, discolored or otherwise abnormal. (see page 18)***
- ***Dispose of old batteries according to local codes and regulations. (see page 18)***
- ***In case of battery leakage, carefully dry the battery terminals and remove all of the leaked liquid. Replace the battery with a new one. (see page 18)***
- ***Do not sterilize in any way other than autoclave. (see page 19)***
- ***Thoroughly clean and wash the components before autoclaving. If chemical solutions or foreign debris are not removed, autoclaving could damage or deform the components. (see page 19)***
- ***Autoclave and dry temperatures must not exceed 135°C (275°F). (see page 19)***
- ***Any chemicals or foreign debris left on instruments could cause them to malfunction or could cause discoloration. (see page 19)***
- ***It is highly recommended to put the contents in a sterilization pouch for autoclaving. (see page 19)***
- ***Never autoclave probe cord. (see page 19)***
- ***Never wipe probe cord with any type of alcohol except Ethanol for Disinfection (Ethanol 80 vol%). (see page 19)***
- ***Occasionally, static electricity produced by wiping the liquid crystal display with a dry cloth may affect the appearance of the display. (see page 19)***
- ***Never use any type of alcohol except Ethanol for Disinfection (Ethanol 80 vol%). Do not use paint thinner, benzene or similar solutions to clean Canal Measurement Module main unit. (see page 19)***
- ***Avoid spilling chemical solutions used for treatment on Canal Measurement Module main unit. These chemicals could damage, deform or discolor Canal Measurement Module main unit. Use extra caution to avoid spilling formalin cresol (FC) and sodium hypochlorite as they are quite strong. Wipe up any chemical spills immediately. (Some chemicals may leave traces even if wiped up immediately.) (see page 19)***

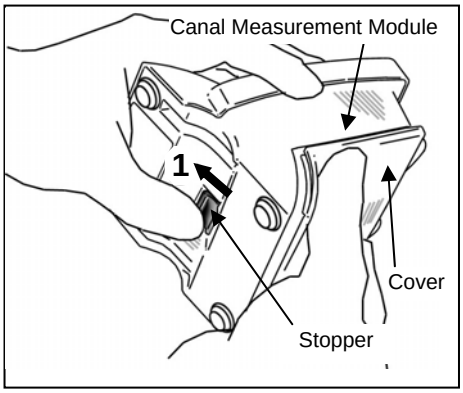
2. Parts Identification

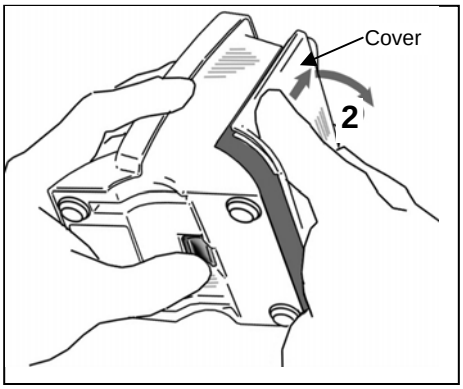


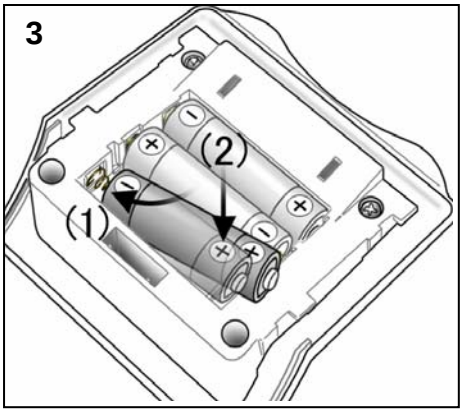
Accessories

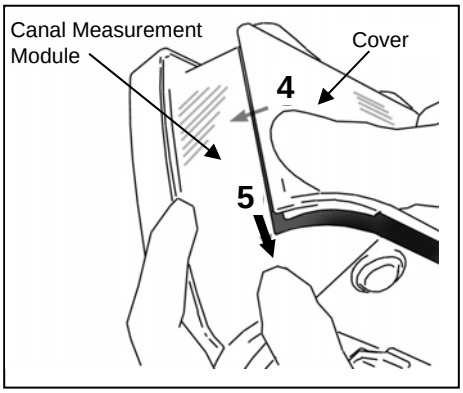
Probe Cord (1)	File Holder (3)	Contrary Electrode (5)
		
Tester (1)	**AA Battery (3)**	**Long File Holder (option)**
		

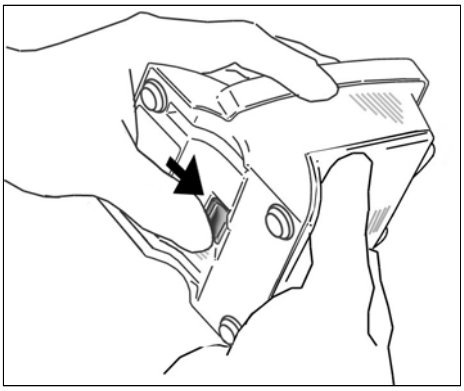
3. Assembling the Unit











Placing the Batteries

⚠ NOTE

- ***Canal Measurement Module is shipped without the batteries installed. Remove the cover and install the 3 AA batteries.***

1. Hold the cover and slide the stopper on the bottom towards the liquid crystal display.

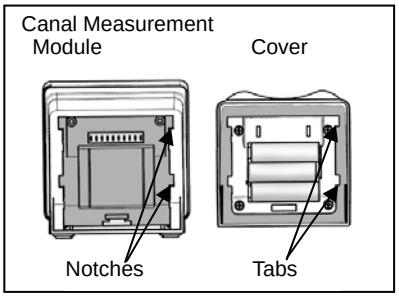
2. Slide the cover in the direction indicated by the arrow in the illustration and remove it from Canal Measurement Module.

3. Place the 3 AA batteries included in the package as indicated on the unit.
   (1) Insert the batteries by first pressing center of the minus end against its spring contact and then sliding the plus end down into place.
   (2) Make sure the contacts are not bent or damaged.

⚠ NOTE

- ***Do not reverse the plus and minus poles.***
- ***Never allow the spring contact to push against the edge of the battery. This could damage the outer cover causing a short or a leakage of battery liquid.***

4. Line up the tabs on the cover with the notches on Canal Measurement Module and slide the cover on.
5. Slide the cover all the way down until it is securely attached.

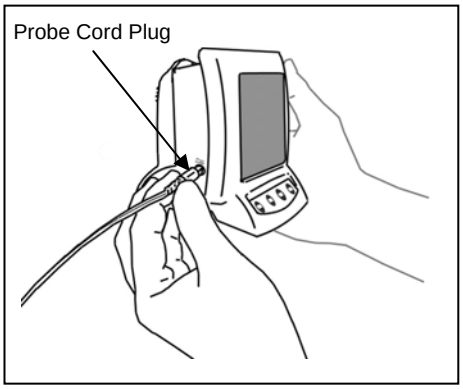


⚠ NOTE

- ***If the catch on the bottom is not back in its original place after attachment, push it in the direction shown by the arrow in the illustration.***
- ***After installation, give the cover a light tug to confirm it is securely attached***

4. Before Using the Unit

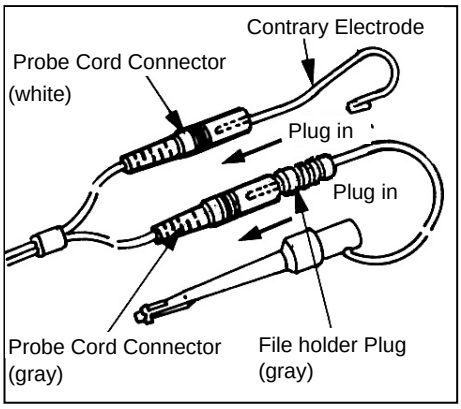
Connecting the Probe Cord



1. Insert the probe cord completely into the jack on the left side of Canal Measurement Module.

⚠ NOTE

- ***Handle Canal Measurement Module carefully; do not drop, bump or expose it to other kinds of impacts or shocks. Rough handling could cause damage.***
- ***Make sure the plug is securely plugged into the jack. A poor connection can cause malfunction.***
- ***Do not drop anything on or bang the plug after it has been inserted into the jack.***



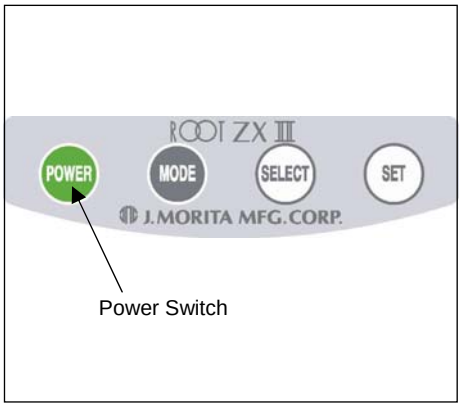
2. Insert the file holder's gray male plug into the gray female connector on the probe cord. Insert the contrary electrode into the white female connector on the probe cord.

⚠ NOTE

- ***Make sure to match colors of the file holder and contrary electrode to the probe cord.***
- ***Measurements cannot be made if these connections are reversed.***

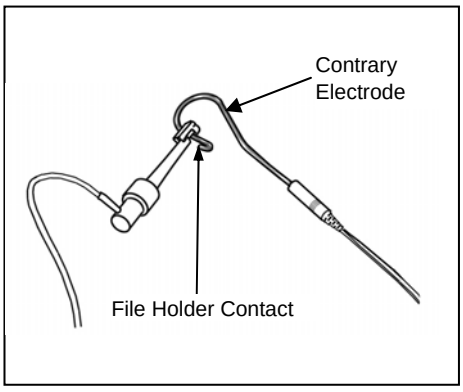
Checking the Function

This checking procedure should be followed at the beginning of every day.

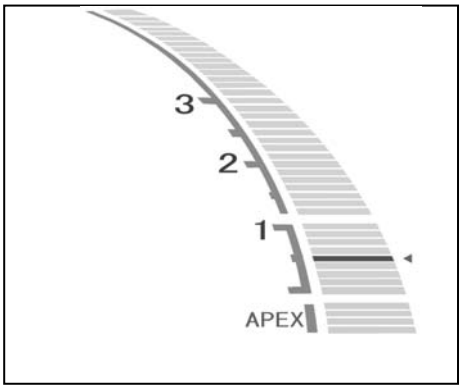


1. Press the Power switch to turn on the unit. The measurement display will appear.

   * The unit will automatically turn off after ten minutes of non-use.



2. Check that the probe cord is properly plugged into the jack.
3. Check that the file holder and contrary electrode are properly connected to the probe cord.
4. Contact metal part of the file holder with contrary electrode.



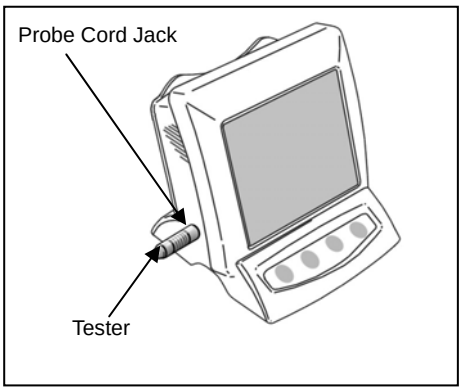
5. Check that all the canal length indicator bars on the display are lit, the word “APEX” flashes and audible beep becomes continuous.

⚠ WARNING

- ***Check the unit’s operation before each patient. If the indicators in the display do not all appear normally, the instrument may not be able to make an accurate measurement. In this case, stop using the instrument and have it repaired.***

Checking the Function with the Tester

Check the root canal measurement’s performance with the tester once a week.

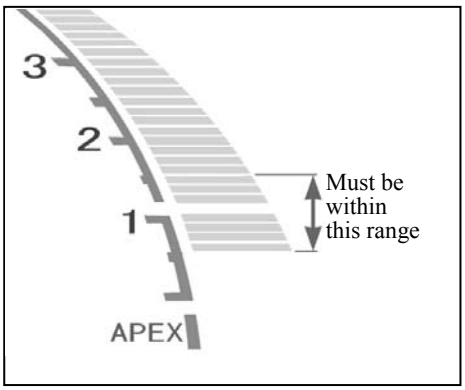


1. Press the Power switch to turn on the unit.
2. Insert the tester into the probe cord jack.

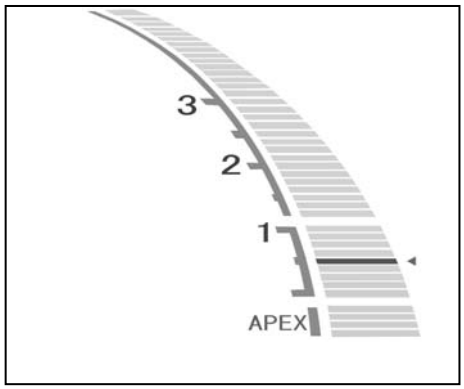
   Check that the meter indicates within ±3 bars from (above or below) the 1.

* The meter may jump when the tester is inserted. If it does, wait for about one second until the meter stabilizes and then check the reading.

* If the reading is 4 or more bars from the 1, the unit will not make accurate measurement. In this case, contact your local dealer or J. Morita regional office.



3. Remove the tester and connect the probe cord.
4. Connect the file holder and contrary electrode to the probe cord.

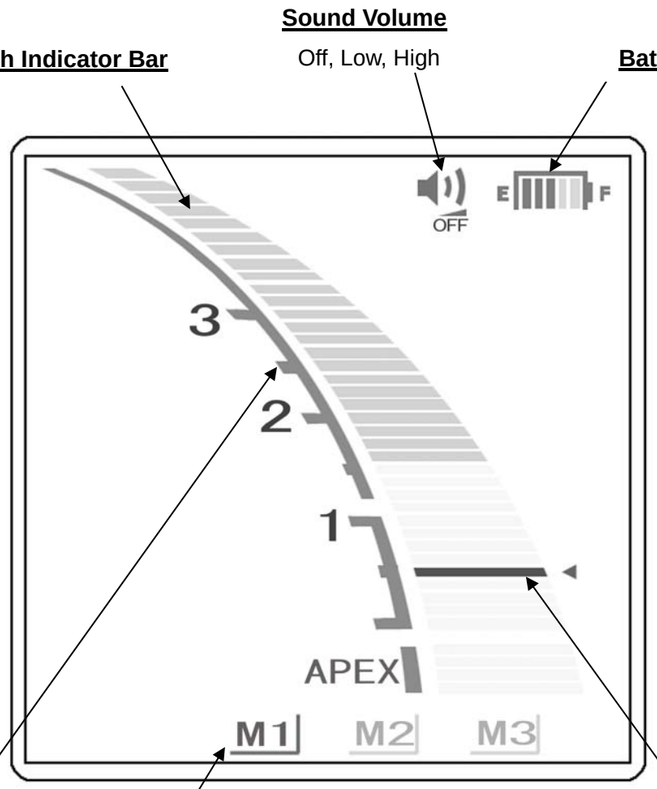


5. Contact metal part of the file holder with contrary electrode.

   Check that all the canal length indicator bar on the display are lit, the word “APEX” flashes and audible beep becomes continuous.

5. Operating the Unit

Operation Panel Display and Switches



Battery Power Indicator

This bar graph indicates remaining battery power. Replace the batteries when this indicator begins flashing.

⚠ WARNING

- ***Never use the unit if the battery power indicator is flashing on and off. The unit will not function properly if the battery power is low.***

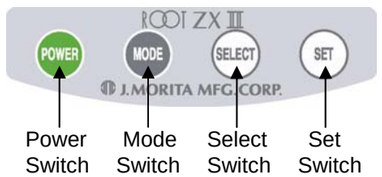
*** Battery power indicator also appears when Handpiece / LED Module is connected.**

Meter Gauge

* The numerals 1, 2 and 3 do not represent length in millimeters.

Apical Line

Use this point as an estimate for root canal measurement. It can be set anywhere between 2 and Apex.



Memory (M1, M2, and M3)

Refer to the section "Setting and Changing Memory" for details.

Setting and Changing Memory

Use the Mode Switch to select M1, M2 or M3. Use the Select switch to select sound volume and Apical Line. Use the Set Switch to set the memory content.

Press Mode to select the memory.		Press Select to select the item.	Press Set to set the memory content.	
MODE Press		SELECT Press (The display will briefly flash on and off.)	SET Press	
→ M1 (Memory 1)	Root Canal Measurement Mode 1	Sound volume selected	OFF	Turn the sound off.
		Flashes		Set the sound volume low.
M2 (Memory 2)	Root Canal Measurement Mode 2			Set the sound volume high.
M3 (Memory 3)	Root Canal Measurement Mode 3	Apical Line selected.	Apical Line	The apical line can be set anywhere between 2 and Apex.
		2 1 APEX Flashes		

* All memory settings will be retained even after the unit is turned off. Simply select M1, M2, or M3 to use those memory settings.

⚠ WARNING

- ***Check the settings displayed after selecting memories.***

Alarm Sound Selection

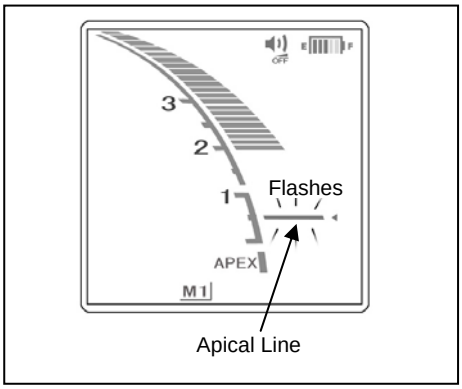
In case 2 or more units are being used, there are two different sounds for the alarm so that you can tell one from the other. To change the sound, hold down the Set switch and turn the unit on.

* The sound that signals switch operation will also change.

* The sound cannot be memorized separately by the three memories (M1, M2 and M3).

* Turn the unit off to save the selection.

Meter Display



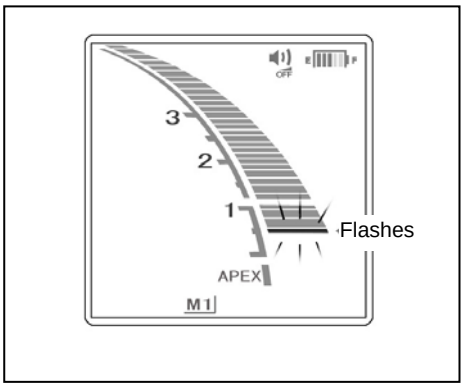
■ The position of the file tip is shown by the canal length indicator bar on the display. The apical line flashes on and off once file is inserted into the root canal.

⚠ NOTE

- ***Do not let the file touch the gums. This will cause the meter to jump to Apex.***
- ***If the canal is extremely dry, the meter may not move until it is quite close to the apex.***
  If the meter does not move, try moistening the canal with oxydol or saline.
- ***Occasionally the canal length indicator bar makes a sudden and large movement as soon as the file is inserted into the root canal, but it will return to normal as the file is advanced down towards the apex.***

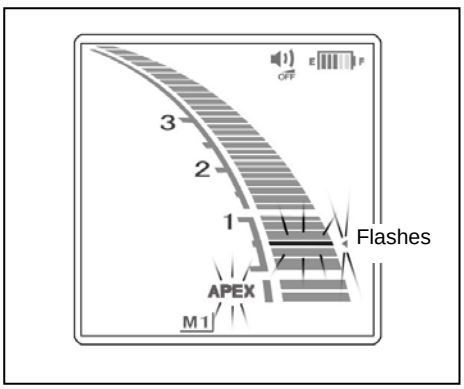
⚠ WARNING

- ***In some cases such as a blocked canal, a measurement cannot be made. (For details, see page 14, "Root Canals not suitable for Electronic Measurement.")***
- ***Always check the measurement with an x ray. In some cases, an accurate measurement cannot be made because of the canal shape, unusual cases, or poor performance of the instrument.***
- ***Stop using the instrument immediately if you sense something odd or abnormal while taking a measurement.***

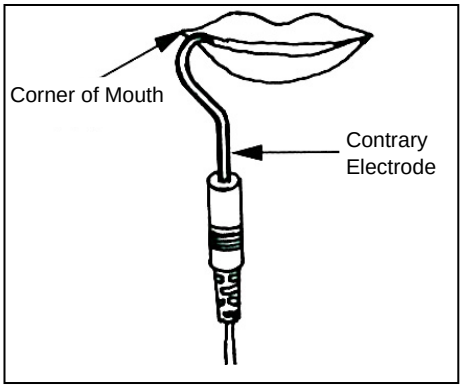


■ The meter's 0.5 reading indicates that the tip of the file is in the apical constriction.

* The numerals on the meter gauge do not represent millimeters.



■ If the file tip passes the point indicated by the apical line, the alarm sound will change from beeping to solid tone. If the file tip reaches the major foramen, the word "APEX" and the little triangle next to the apical line will start to flash.



Operating the Unit

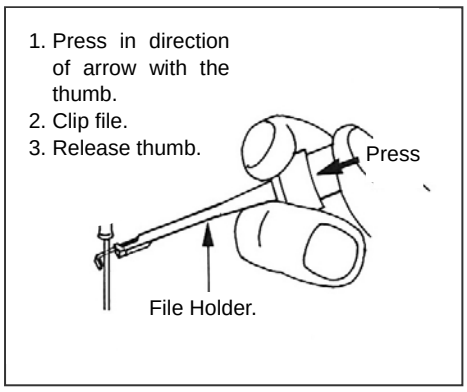
1. Turn on the unit.
2. Hook the contrary electrode in the corner of the patient's mouth.

⚠ WARNING

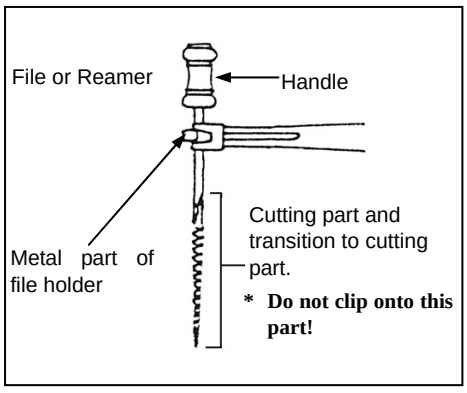
- ***Do not use an ultrasonic scaler with the contrary electrode attached to the patient. This is dangerous because electrical noise from the scaler could interfere with canal measurements and motor operation.***
- ***Make sure that the contrary electrode, file holder, handpiece file electrode, etc., do not come into contact with an electric power source such as an electrical socket. This could result in a severe electrical shock.***

⚠ NOTE

- ***The contrary electrode could cause an adverse reaction if the patient has an allergy to metals. Ask the patient about this before using the contrary electrode.***
- ***Take care that medicinal solutions such as formalin cresol (FC) or sodium hypochlorite do not get on the contrary electrode or the file holder. These could cause an adverse reaction such as inflammation.***



3. Clip the file holder to the metal shaft of the file.

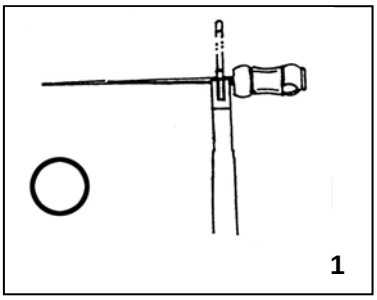


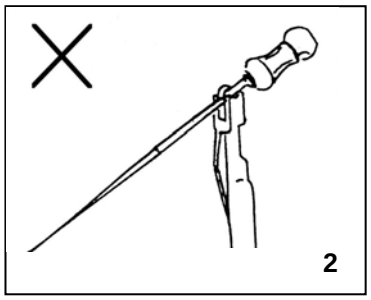
⚠ NOTE

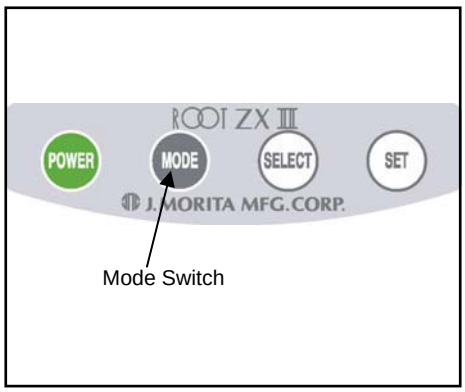
- ***Always clip the file holder to the upper part of file shaft, near the handle. The metal and plastic part of the file holder can be damaged if they are attached to the file's cutting part or the transition to the cutting part.***

⚠ NOTE

- ***Use files and reamers with plastic handles only. If the file has a metal handle, electrical leakage will occur when the handle is touched by fingers and it will prevent an accurate root canal measurement. Even if the file handle is made of plastic, make sure not to touch the metal part of the file with finger.***
- ***Do not use damaged file holders. An accurate measurement cannot be made using a damaged file holder.***
- ***Clip the file as shown in illustration #1 below. If the file is forced into the position shown in illustration #2, it may not make an accurate measurement and the file holder could be damaged.***



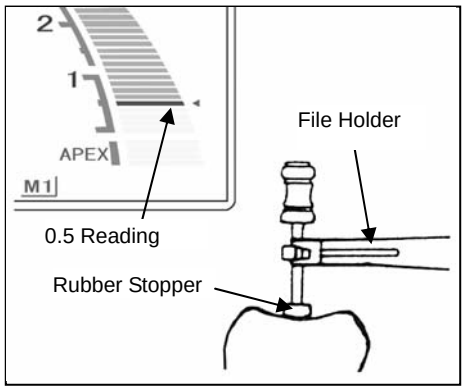




4. Press the mode switch to select memory 1, 2 or 3 (M1, M2 or M3).

   * See "Setting and Changing Memory", on page 10 for how to set the memory contents.

   * While an actual measurement is being made, none of the switches, except the power switch, will work.



5. Insert the file (in most case size 10) until the meter reads 0.5 (this point can be recognized by the change in the alarm sound as well). Then advance the file with slow clockwise turns until the word "APEX" begins to flash. When the apex is reached, turn the file with slow counter clockwise turns until meter reads 0.5 again. Since some canals have multiple constrictions, it is essential that the file be taken to the apex then returned to the apical constriction (0.5 reading). Position the rubber stopper on the tooth surface as a reference point to determine the root canal's working length.

■ **After root canal's working length is determined, turn off the unit, disconnect the probe cord from the main unit and remove the file holder and contrary electrode from the probe cord.**

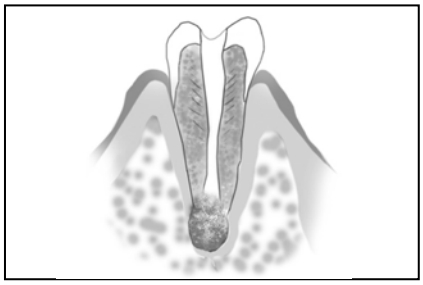
*** Working length differs somewhat depending on each individual tooth. The discrepancy must be judged by the dentist.**

⚠ NOTE

- ***Make sure to take an x-ray to check the results.***

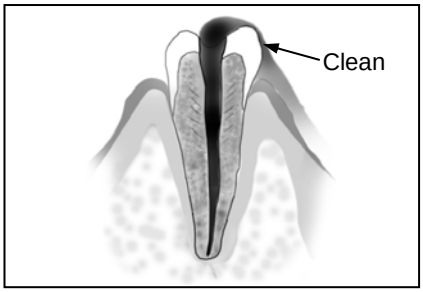
Root Canals not suitable for Electronic Measurement Reading (EMR)

Accurate measurement cannot be obtained with the root canal conditions shown below.
There may be other cases that an accurate measurement cannot be made.



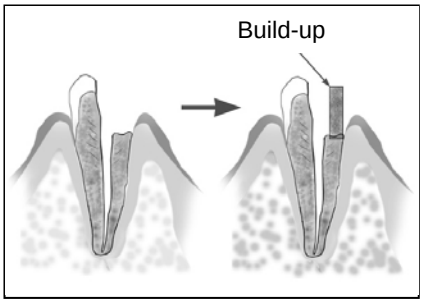
Root Canal with a large apical foramen

Root canal that has an exceptionally large apical foramen due to a lesion or incomplete development cannot be accurately measured; the results will show shorter measurement than the actual length.



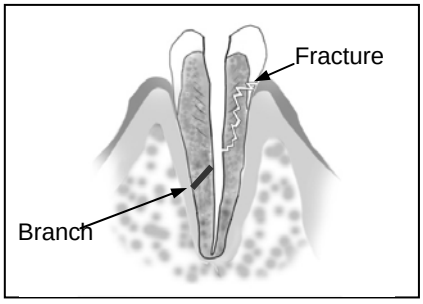
Root Canal with blood, saliva or a chemical solution overflowing from the opening

If blood, saliva, or a chemical solution overflow from the opening of the root canal and contacts the gums, this will result in electrical leakage and an accurate measurement cannot be obtained. Wait for bleeding to stop completely. Clean the inside and opening of the canal thoroughly to get rid of all blood, saliva and chemical solutions and then make a measurement.



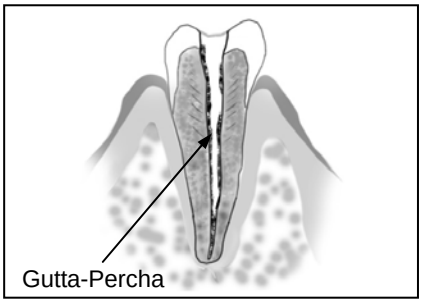
Broken crown

If the crown is broken and a section of the gingival tissue intrudes into the cavity surrounding the canal opening, contact between the gingival tissue and the file will result in electrical leakage and an accurate measurement cannot be obtained. In this case, build up the tooth with a suitable material to insulate the gingival tissue.



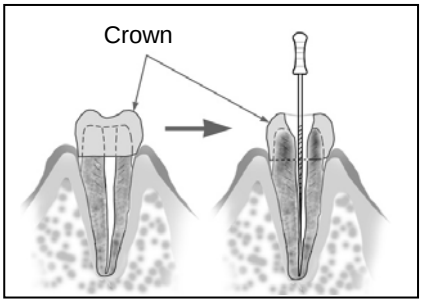
Fractured tooth
Leakage through a branch canal

Fractured tooth will cause electrical leakage and an accurate measurement cannot be obtained.
A branch canal will also cause electrical leakage.



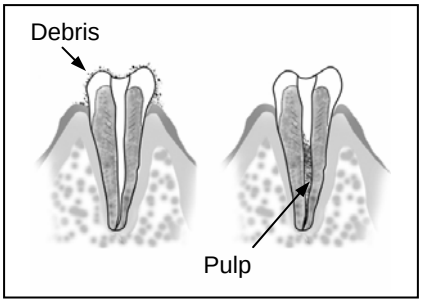
Re-treatment of a root filled with gutta-percha

The gutta percha must be completely removed to eliminate its insulating effect. After removing the gutta percha, pass a small file all the way through the apical foramen and then put a little saline in the canal but do not let it overflow the canal opening.



Crown or metal prosthesis touching gingival tissue

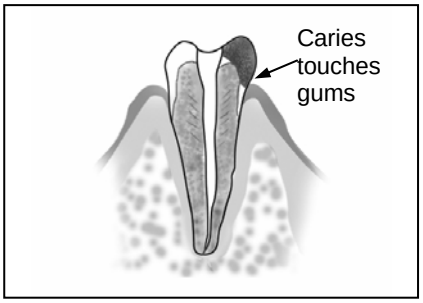
Accurate measurement cannot be obtained if the file touches a metal prosthesis that is touching gingival tissue. In this case, widen the opening at the top of the crown so that the file will not touch the metal prosthesis before taking a measurement.



Cutting debris on tooth

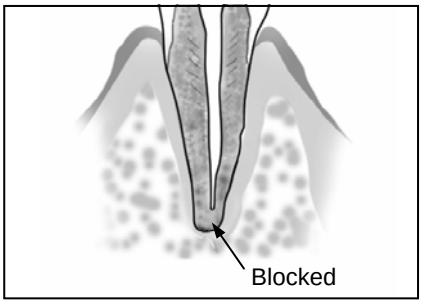
Pulp inside canal

Thoroughly remove all cutting debris on the tooth.
Thoroughly remove all the pulp inside the canal; otherwise an accurate measurement cannot be made.



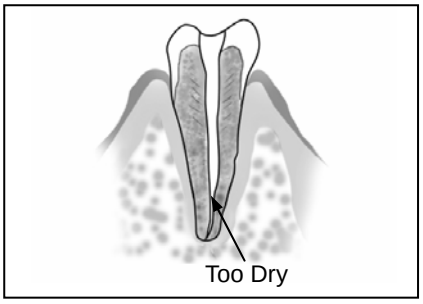
Caries touching the gums

In this case, electrical leakage through the caries infected area to the gums will made it impossible to make an accurate measurement.



Blocked Canal

The meter will not move if the canal is blocked.
Open the canal all the way to the apical constriction to measure it.



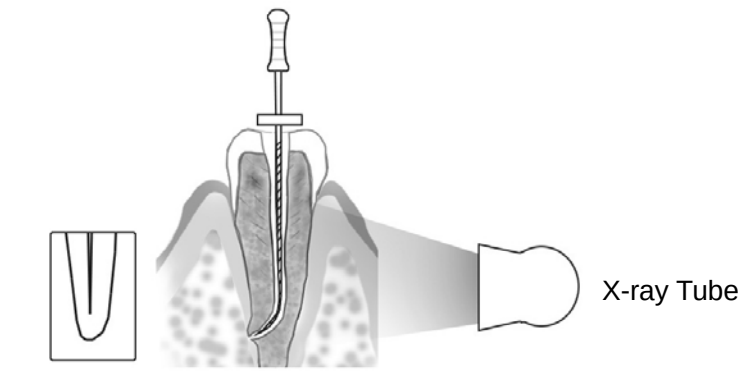
Extremely dry canal

If the canal is extremely dry, the meter may not move until it is quite close to the apex. In this case, try moistening the canal with oxydol or saline.

EMR and Radiography

Sometimes the EMR and the x-ray image do not correspond. This does not mean that the unit is not working properly or that the x-ray exposure is inaccurate.

* Frequently, the actual apical foramen and anatomical apex do not correspond exactly. The actual apical foramen may be located towards the crown. In this case, the x-ray image will seem to indicate that the file has not reached the apex.



Apical foramen is located up towards the crown.

* Depending on the penetration angle of the x-ray beam, the apex may not appear correctly. The position of the apical foramen may appear to be located differently than it actually is.

6. After Using the Unit

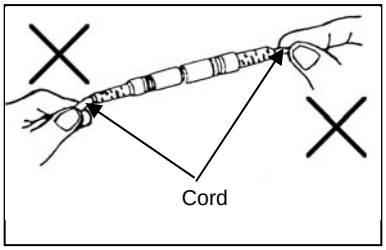
1. Turn off the unit.

   * The unit will automatically turn off after 10 minutes of non-use.

2. Disconnect the probe cord from the unit and remove the file holder and contrary electrode from the probe cord.

⚠ NOTE

- ***When disconnecting and connecting the contrary electrode, probe cord and file holder, never pull or push on the cords themselves; always grip the connectors.***
- ***Do not wrap the probe cord around the body of the main tube.***



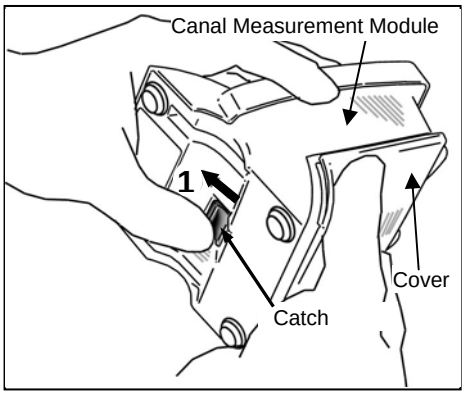
Replacing Batteries

Replace the batteries as soon as the battery power indicator starts flashing.

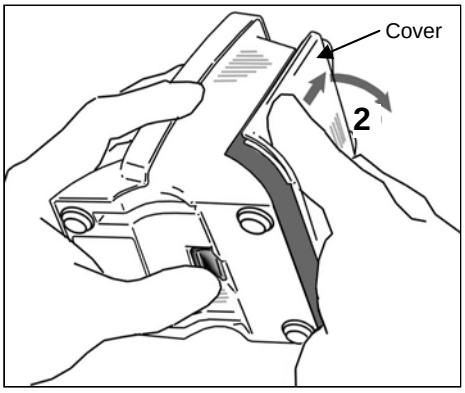
* To be on the safe side, replace the batteries when the battery power indicator displays two lines.

⚠ WARNING

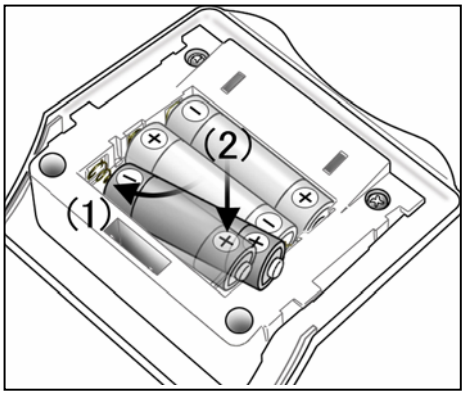
- ***Do not use the unit if the battery power display is flashing. The unit may not function properly if the battery power is low.***



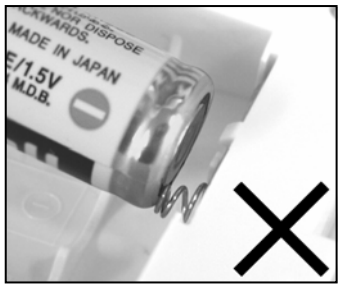
1. Hold the cover and slide the stopper on the bottom towards the liquid crystal display.



2. Slide the cover in the direction indicated by the arrow in the illustration and remove it from Canal Measurement Module.

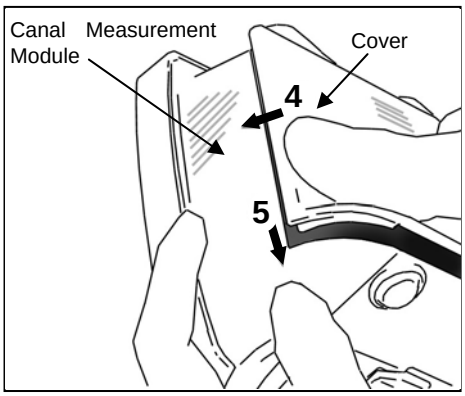


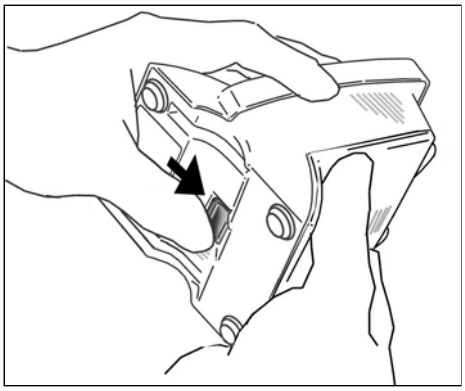
3. Take out the old batteries and replace them with new ones. Make sure the plus and minus poles are correctly lined up.
   (1) Insert the batteries by first pressing center of the minus end against its spring contact and then sliding the plus end down into place.
   (2) Make sure the contacts are not bent or damaged.



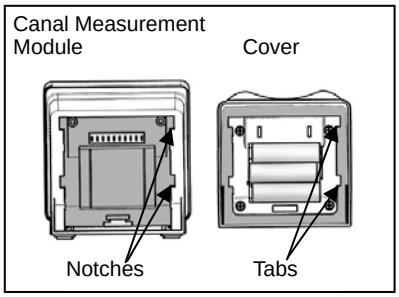
⚠ NOTE

- ***Do not reverse the plus and minus poles.***
- ***Never allow the spring contact to push against the edge of the battery. This could damage the outer cover causing a short or a leakage of battery liquid.***





4. Line up the tabs on the cover with the notches on Canal Measurement Module and slide the cover on.
5. Slide the cover all the way down until it is securely attached.



⚠ NOTE

- ***If the catch on the bottom is not back in its original place after attachment, push it in the direction shown by the arrow in the illustration.***
- ***After installation, give the cover a light tug to confirm it is securely attached.***

⚠ NOTE

- ***Always use alkaline AA batteries.***
- ***Never use rechargeable nickel-hydrogen or nickel-cadmium batteries.***
- ***Replace all three batteries at the same time.***
- ***Make sure that the plus and minus poles are correctly aligned.***
- ***Never use batteries that are leaky, deformed, discolored or otherwise abnormal.***
- ***Dispose of old batteries according to local codes and regulations.***
- ***In case of battery leakage, carefully dry the battery terminals and remove all of the leaked liquid. Replace the battery with a new one.***

* Overheating could result if the above conditions are not adhered to.

* The three AA alkali dry cells used for this unit will last for about 100 hours of use. (This equals 6 to 12 months at normal rates of usage.)

7. Sterilization and Replacement Parts

Sterilization

a. Autoclavable Components

[File Holder and Contrary Electrode]

Recommended temperature and time: 135°C (275°F), 6 minutes minimum with a sterilization pouch. Minimum drying time after sterilization: 10 minutes.

⚠ WARNING

- ***Autoclave file holder and contrary electrode after each patient.***

⚠ NOTE

- ***Do not sterilize in any way other than autoclave.***
- ***Thoroughly clean and wash the components before autoclaving. If chemical solutions or foreign debris are not removed, autoclaving could damage or deform the components.***
- ***Autoclave and dry temperatures must not exceed 135°C (275°F).***
- ***It is highly recommended to put the contents in a sterilization pouch for autoclaving.***
- ***Never autoclave probe cord.***

b. Non-Autoclavable Components

[Probe Cord]

* Wipe probe cord with a piece of gauze dampened with Ethanol for Disinfection (Ethanol 80 vol%).

⚠ NOTE

- ***Never wipe probe cord with any type of alcohol except Ethanol for Disinfection (Ethanol 80 vol%).***

c. Canal Measurement Module Main Unit

* To clean the surface of Canal Measurement Module main unit, use a soft cloth to apply a little neutral detergent and then rinse it with a cloth moistened with water.

⚠ NOTE

- ***Occasionally, static electricity produced by wiping the liquid crystal display with a dry cloth may affect the appearance of the display.***
- ***Never use any type of alcohol except Ethanol for Disinfection (Ethanol 80 vol%). Do not use paint thinner, benzene or similar solutions to clean Canal Measurement Module main unit.***
- ***Avoid spilling chemical solutions used for treatment on Canal Measurement Module main unit. These chemicals could damage, deform or discolor Canal Measurement Module main unit. Use extra caution to avoid spilling formalin cresol (FC) and sodium hypochlorite as they are quite strong. Wipe up any chemical spills immediately. (Some chemicals may leave traces even if wiped up immediately.)***

Replacement Parts

* Replace parts as necessary depending on degree of wear and length of use.
* Order replacement parts from your local dealer or J. Morita regional office.

Storage

* Store the unit where it will not be exposed to x-rays or direct sunlight and where the ambient temperature range is between -10°C / 14°F and 70°C / 158°F ; humidity between 8 RH and 80 RH % (without condensation) and atmospheric pressure between 700 hPa and 1,060 hPa.
* If the unit has not been used for a long time, make sure it works properly before using.
* Always remove the batteries prior to storing or shipping the unit.
* Working life: The working-life of this unit is 6 years from the date of shipment provided it is regularly and properly inspected and maintained.

8. Maintenance and Inspection

* The user (hospital, medical institute or clinic) is responsible for inspection and maintenance of the units.)

Regular Inspection

* This unit should be inspected every 6 months in accordance with the following maintenance and inspection items.

Maintenance and Inspection Items

1. Check that the Power switch turns the unit on and off properly.
2. Insert the Tester and check that the indicator is within ±3 lines of 1 on the meter.
3. Check that the Mode switch changes the memory from M1 to M2 to M3 etc.
4. Check that the Select and Set switches work properly.
5. Check that the probe cord can be properly plugged into its jack.
6. Check that the file holder's plug can be connected properly to the probe cord and that the file holder can be clipped onto a file. Check the contrary electrode can be plugged into its probe cord connector.

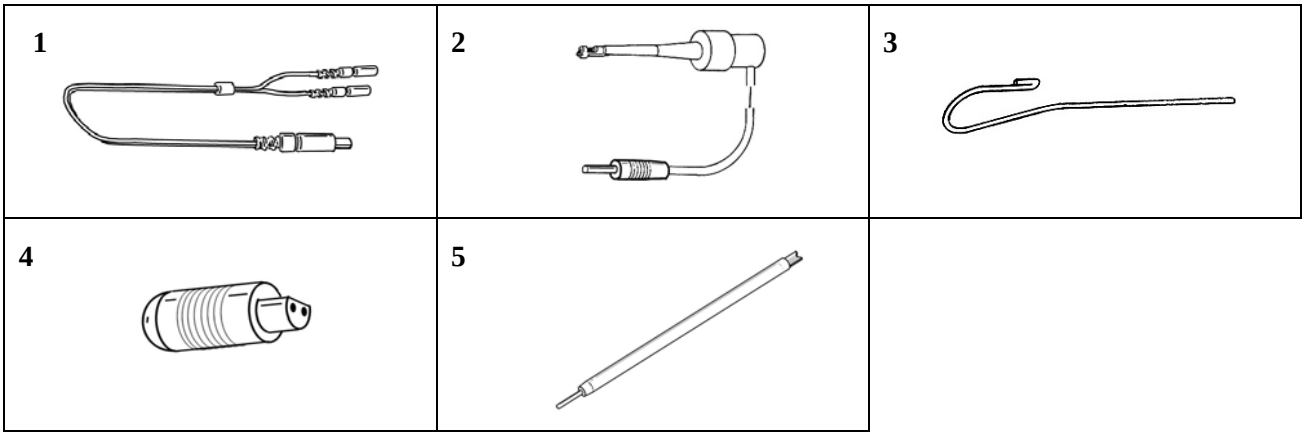
9. Troubleshooting

If the unit does not seem to be working properly, the user should first try to troubleshoot to solve operational problems. If the problems can not be solved after referring to the list below, contact your local dealer or J. Morita regional office.

Problem	Check Points	Response
No power	Check battery installation. Check battery power.	Install batteries properly. Replace batteries.
Cannot make a Measurement	Check cord connections. Check probe cord for broken wire.	Check that all connections are properly secured. Touch the contrary electrode to the file holder to check probe cord conductivity.
No sound	Check if sound is turned off.	Turn on the sound.
Cannot switch memories Cannot change memory settings	Is a measurement being performed? Does the switch work?	Switches do not work during measurement. Switch may be broken.
Display does not appear.	Is there a sound when the unit is turned on and off?	Replace batteries if there is no sound. Broken display if there is a sound.
Canal Length Indicator is unstable.	Is contrary electrode making good contact with oral mucosa? Is the file holder dirty?	Make sure the contrary electrode makes good contact with the oral mucosa. Clean the file holder with Ethanol for Disinfection (Ethanol 80 vol%).
Canal Length Indicator overreacts or is too sensitive. (Measurements are too short. Poor accuracy. Erratic results.)	Is blood or saliva overflowing from the opening of the crown? Is the root canal filled with blood, saliva or chemical solutions? Is the tooth surface covered with cutting debris or chemical solutions? Is the file touching the gingival tissue? Is there pulp tissue left inside the root canal? Is the file touching a metal prosthesis? Are proximal surfaces infected with caries?	If blood or other fluids overflow the canal, the current will leak to the gums and the meter will jump to Apex. Clean the canal, canal opening and tooth crown thoroughly. The canal length indicator bar may suddenly swing when it breaks the surface of fluids inside the root canal, but it will return to normal as it approaches the apex. Clean entire tooth surface. This will cause the canal length indicator bar to suddenly jump all the way to the “APEX”. An accurate measurements cannot be obtained if a large amount of pulp tissue is left inside the root canal. Touching a metal prosthesis with the file allows a flow of current to the gingival tissue or periodontal pocket and will cause the meter to jump to the “APEX”. Current can flow through the caries infected area to the gums and prevent an accurate measurement from being made.

Problem	Check Points	Response
Canal Length Indicator overreacts or is too sensitive. (Measurements are too short, poor accuracy or erratic results.)	Are there lateral canals or is the tooth fractured?	The canal length indicator bar may jump to "APEX" when it reaches the opening of a lateral root canal or the opening of a fractured tooth which allows the current to flow to the gingival tissue.
	Does a broken crown allow leakage of electric current?	Build up an insulating barrier to stop the leakage.
	Is there a lesion at the apex?	A lesion can destroy the apical foramen through absorption and an accurate measurement cannot be obtained.
	Is the file holder broken or dirty?	Replace or clean the file holder.
Canal Length Indicator bar does not move (except when very near the apical foramen).	Is root canal blocked?	Canal length indicator will return to normal when the file reaches apical constriction.
	Is the apical foramen very large and open?	If the apical foramen is large or wide open and not completely formed, the canal length indicator bar will suddenly jump when the file tip gets close to the apex.
	Is root canal extremely dry?	Moisten the root canal with hydrogen peroxide or a saline solution.
	A small file in a large root canal.	Increase the size of the file.

10. Replacement Parts List



No.	Description
1	Probe Cord
2	File Holder (5)
3	Contrary Electrode (5)
4	Tester
5	Long File Holder (1)

11. Technical Description

Main unit and accessories

Model	DP-ZX-VL
Type	RCM-EX

Classification

Safety according to IEC 60601-1, IEC 60601-1-2, UL 60601-1, ISO 11498, ISO 7785-2, CAN/CSA C22.2 No.601.1-M90
European Directive 93/42/EEC IIa
Canada Medical devices Class II

Type of Protection against Electric Shock	Battery operated
Degree of Protection against Electric Shock	Type B applied part
Degree of Protection (IEC 60529)	IPX O
Mode of Operation	Continuous

Intended use

It can be used to measure the length of the canal.

Main unit

Rated Voltage	DC 4.5 V (with battery operation)
Rated Current	max. 0.03 A (with battery operation)
Power Consumption	0.135 VA (with battery operation)
Dimensions	Canal Measurement Module 115 ± 20(mm) x 105 ± 20(mm) x 105 ± 20(mm)
Weight	Canal Measurement Module Approximately 370 g

Operation, Transport and Storage Conditions for the main unit

Operating Conditions

Ambient temperature range	+10° / 50° F ~ +40° C / 104° F
Relative humidity	30 ~ 80 RH % without condensation
Atmospheric pressure range	800~ 1,060 hPa

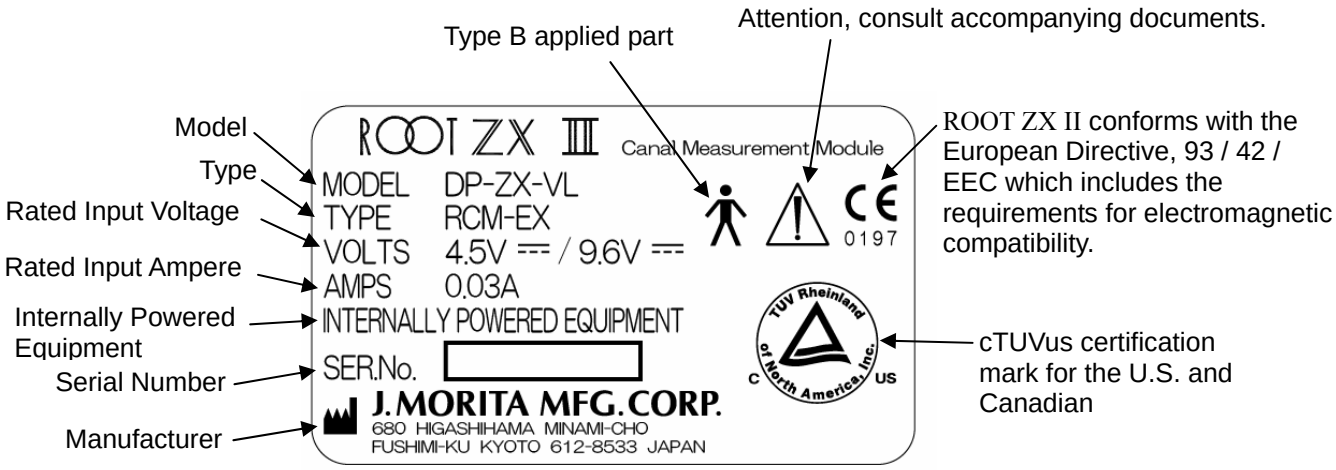
Transport and Storage Conditions

Ambient temperature range	-10° / 14° F ~ +70° C / 158° F
Relative humidity	8 ~ 80 RH % without condensation
Atmospheric pressure range	700 ~ 1,060 hPa

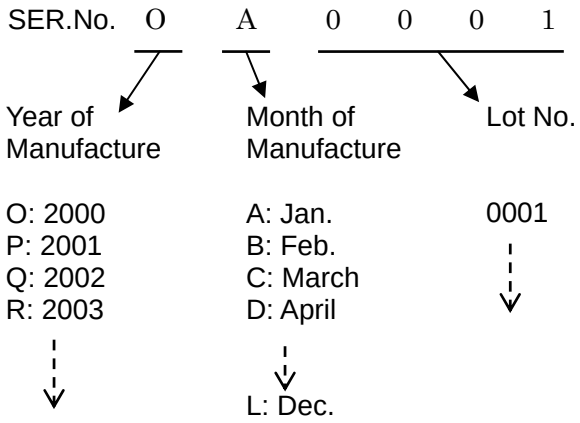
Symbols

Rated Label

* Distributor on the label is different depending on the market where it is installed.



Example of Serial Number



Operation Instructions

Authorized representative in the European Community

Package

Temperature Limitation

Disposal

The package should be recycled. Metal parts of the device are disposed as scrap metal. Synthetic materials, electrical components, and printed circuit boards are disposed as electrical scrap. Material must be disposed according to the relevant national legal regulations. Consult specialized disposal companies for this purpose. Please inquire of the local city / community administrations concerning local disposal companies.

Service

ROOT ZX II may be repaired and serviced by

- the technicians of J. Morita's subsidiaries all over the world.
- technicians employed by authorized J. Morita dealers and specially trained by J. Morita.
- independent technicians specially trained and authorized by J. Morita.

Appendix- Electromagnetic declaration

Guidance and manufacturer's declaration – electromagnetic emissions		
The **DP-ZX-VL** is intended for use in the electromagnetic environment specified below. The customer or the user of the **DP-ZX-VL** should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The **DP-ZX-VL** uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The **DP-ZX-VL** is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
*Harmonic emissions IEC61000-3-2	Class A	
*Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

*Indicates data when Handpiece / LED Module is connected to Canal Measurement Module.

Guidance and manufacturer's declaration – electromagnetic immunity			
The **DP-ZX-VL** is intended for use in the electromagnetic environment specified below. The customer or the user of the **DP-ZX-VL** should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±2, 4, 6 kV contact ±2, 4, 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
*Electrical fast transients/bursts IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2.0 kV for power supply lines ±1.0 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
*Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	±0.5, 1 kV line(s) to line(s) ±0.5, 1, 2kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
*Voltage dips, short interruptions and voltage variations on power supply lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	0% U_T (>95% dip in U_T) /0.5 periods 40% U_T (60% dip in U_T) /5 periods 70% U_T (30% dip in U_T) /25 periods 0% U_T /5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If user of the **DP-ZX-VL** requires continued operation during power mains interruptions, it is recommended that the **DP-ZX-VL** be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3.15 A/m	Power frequency magnetic field should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note U_T is the a.c. mains voltage prior to application of the test level.			

*Indicates data when Handpiece / LED Module is connected to Canal Measurement Module.

Guidance and manufacturer's declaration – electromagnetic immunity

The **DP-ZX-VL** is intended for use in the electromagnetic environment specified below. The customer or the user of the **DP-ZX-VL** should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the **DP-ZX-VL**, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 V	$d = 1.11\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 0.95\sqrt{P}$ 80 MHz to 800 MHz $d = 1.89\sqrt{P}$ 800MHz to 2.5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected be absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for ratio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicated theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the **DP-ZX-VL** is used exceeds the applicable RF compliance level above, the **DP-ZX-VL** should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting of relocating the **DP-ZX-VL**.

[b] Over the frequency range 150 kHz to 80MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the DP-ZX-VL.

The **DP-ZX-VL** is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the **DP-ZX-VL** can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the **DP-ZX-VL** as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter** m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.69	3.69	7.38
100	11.67	11.67	23.33

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

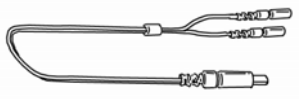
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Essential Performance

Noise does not substantially change measurement.

Accessory

Probe Cord Code No.7503661



⚠ WARNING

- ***Use of the parts other than those accompanied or specified by J. Morita Mfg. Corp. may result in increased EMC emissions or decreased EMC immunity of the DP-ZX-VL.***

12. Warranty

1 Year Limited Warranty

1. The manufacturer gives a worldwide guarantee for one year beginning from the date of purchase. Within this period any defect that is due to faulty manufacturer or material will be remedied by repair or replacement at the judgment of the manufacturer or its distributor.
2. Warranty repair and service: In the event of a claim under this guarantee, the device is to be sent to the service facility of the distributor, **postage and shipping paid**, including a short description of the problem, and a copy of the sales receipt from the dealer as proof of purchase and title to warranty. **Always ship prepaid. Distributor does not accept collect shipments.**
3. In the case of damage caused by wear and tear, careless handling and repairs not carried out by an authorized service facility, the warranty ceases to be valid. This guarantee may not form the basis for any claims for damages, in particular not for compensation of consequential damages.

   The buyer assumes responsibility for damage due to dropping of the unit, improper use and utilization of product and chemicals other than those stated in this instruction manual for cleaning. It is the customer's responsibility to maintain the exact rated voltage indicated at the bottom of the unit, and the office maintains electrical outlets for proper performance of the unit.
4. **This warranty does not include the external accessories, file electrode, batteries, or transportation costs.**

ATTENTION

1. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from repairs made by personnel not authorized by the J. Morita Mfg. Corp.
2. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from any changes, modifications, or alterations of its products.
3. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from the use of products or equipment made by other manufacturers, except for those procured by the J. Morita Mfg. Corp.
4. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from maintenance or repairs using parts or components other than those specified by the J. Morita Mfg. Corp. and in their original condition.
5. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from operating the equipment in ways other than the operating procedures described in this manual or resulting from not following the cautionary remarks and warnings in this manual.
6. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from workplace conditions and environment or installation conditions such as improper electrical power supply which do not conform to those stated in this manual.
7. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from fires, earthquakes, floods, lightning, natural disasters, or acts of God.
8. J. Morita Mfg. Corp. will supply replacement parts and be able to repair the product for a period of 10 years after the manufacture of the product has been discontinued.

* Inspect the unit every 6 months in accordance with the Maintenance and Inspection items on page 20.

* Refer to the parts replacement lists and replace worn parts whenever necessary.

J. MORITA MFG. CORP.
680 Higashihama Minami-cho, Fushimi-ku, Kyoto, 612-8533 Japan
www.jmorita-mfg.com

Distributors

J. MORITA CORPORATION
Tokyo Office : 11-15, 2-Chome Ueno, Taito-ku, Tokyo, 110-8513 Japan
Osaka Office : 33-18, 3-Chome Tarumi-cho, Suita, Osaka, 564-8650 Japan

J. MORITA USA, Inc.
9 Mason Irvine, CA 92618 U.S.A.
TEL:+1-949-581-9600 FAX: +1-949-465-1095

J. MORITA EUROPE GMBH
Justus-Von-Liebig-Strasse 27A, D-63128 Dietzenbach Germany
TEL: +49-6074-836-0 FAX: +49-6074-836-299

Siamdent Co., Ltd.
71/10 Bangpakong Industrial Park I, Bangna-Trad, KM. 52, Bangpakong
Chachuengsao 24130, Thailand
TEL: +66-38-57-3042 FAX: +66-38-57-3043

J. MORITA CORPORATION Australia and New Zealand
Suite 2.05, Aero 247 Coward Street Mascot NSW 2020, Australia
TEL: +61-2-9667-3555 FAX: +61-2-9667-3577

EU Authorized Representative under the European Directive 93/42/EEC

EC REP **MEDICAL TECHNOLOGY PROMEDT CONSULTING GMBH**

Altenhofstraße 80, 66386 St. Ingbert, Germany
TEL: +49-6894-581020 FAX: +49-6894-581021
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